Dy Omesh Pander CED Z Roll No...... National Institute of Technology, Hamirpur (H.P.)

Name of the Examination: B.Tech (End Semester Exam, Year-2023)Branch: Civil EngineeringSemester: VIthCourse Name: Design of Steel StructureCourse Code: CE-321Time Allowed: 3 HoursMaximum Marks: 50.00

(Note: All Questions are compulsory and distribution of marks are shown in all questions, Candidates can use their own steel tables and IS 800-2007 code)

- Q-1 Design the slab base and the foundation for a column ISMB 325 subjected to an axial factored load of 900 kN and a factored bending moment @ major axis of 20kNm. The base plate rests on concrete of grade M25 and the bearing capacity of hard soil is 500kN/m².
- Q-2 Find the tensile strength of a single angle ISA $110 \times 110 \times 8$ mm with one leg connected to gusset by means of three bolts of 22mm dia at pitch of 80mm c/c in one line, $f_y=250$ MPa, $f_u=410$ MPa (10 Marks)
- Q-3 Find the Load carrying capacity of 2×ISLC 400 sections placed face to face over total width of 300 mm. Length of column is 3m with both ends hinged. Also calculate to moment, shear, spacing of battens and effective depth of end and intermediate battens in the battening system for the above problem. Take $f_y=250$ MPa. (10 Marks)
- Q-4(a) Calculate the moment carrying capacity of a laterally unrestrained ISMB 300 member of length 4 m. (5 Marks)
 - (b)Design a simply supported beam (Laterally restrained) of span 6 m, carries, an imposed service load and dead load of 20 kN/m and 20kN/m respectively. Assume Fe 410 grade steel. (5 Marks)
- Q-5 (a)A single-bolted double cover butt joint to connect two plates 6 mm thick as shown in Figure-1. Assuming, the bolts of 20 mm diameter at 60 mm pitch. Calculate the efficiency of the joint. Use 410 MPa Plates and 4.6 grade bolts (for 4.6 grade bolt, Yield stress =240MPa & Ultimate stress=400MPa). (5 Marks)



Figure-1

(b) Determine the Plastic Section Modulus of a rectangular section of width 'b' and Depth 'd'. Also find the radius of gyration about both the axis for this rectangular section. (5 Marks)